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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/483,737

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Hansjorg Reichert

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EXAMINER

SEFER, AHMED N

ART UNIT

PAPER NUMBER

2826

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

01/18/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

09/483,737

Applicant(s)

REICHERT ET AL.

Examiner

A. Sefer

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 31 October 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1, 9, 10 and 15 is/are pending in the application.
- 4a) Of the above claim(s) 1, 9 and 10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

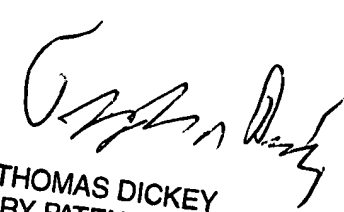
- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.

- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

  
THOMAS DICKEY  
PRIMARY PATENT EXAMINER

## DETAILED ACTION

### *Response to Amendment*

1. The amendment filed October 31, 2006 has been entered; no new claims have been introduced.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Spaeth et al. ("Spaeth") USPN 5,943,553 in view of Komata et al. ("Komata") JP 2-15897 (of record).

Spaeth discloses in figs. 1 and 2 a semiconductor component comprising a solder 4 containing at least two components with at least two constituents including a first constituent containing a precious metal **Au** and a second constituent **Sn**; a substrate 3; a semiconductor chip (1, 2) having a rear side and an adhesive or diffusion barrier (col. 3, lines 52-58) provided on said rear side; said adhesive or diffusion barrier being provided directly on said solder; and said semiconductor chip being secured at said rear side to said substrate using said solder to form a chip-substrate connection by said solder and having a thickness within the range recited in the claim (col. 3, lines 49-51), but lacks anticipation of solder having a hypereutectic concentration of said second constituent.

Komata discloses a solder composition containing two components with

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two metal-containing constituents including a constituent formed of precious metal or gold and a second constituent or tin, and said solder composition having a hypereutectic concentration of the second constituent wherein said solder composition is Sn: 12-37 wt% and Au: balance.

Therefore, in view of Komata's teachings, a person skilled in the art would be motivated to provide a hypereutectic concentration of tin as disclosed by Komata. The motivation to do so is that the Au-Sn alloy solder exhibits good formability and good ductility as taught by Komata.

4. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kurokawa et al. ("Kurokawa") JP 63-136533 in view of Komata and Bacon et al. ("Bacon") USPN 5,234,153 (all of record).

Kurokawa discloses in figs. 1 and 2 a semiconductor component comprising a solder 4 containing at least two components with at least two constituents including a first constituent containing a precious metal **Au** and a second constituent **Sn**; a substrate 1; a semiconductor chip 3 having a rear side and an adhesive or diffusion barrier 9/10 provided on said rear side; said adhesive or diffusion barrier being provided directly on said solder; and said semiconductor chip being secured at said rear side to said substrate using said solder to form a chip-substrate connection by said solder, but lacks anticipation of solder having the recited thickness and a hypereutectic concentration of said second constituent.

Komata discloses a solder composition containing two components with two metal-containing constituents including a constituent formed of precious metal or gold and a second constituent or tin, and said solder composition having a hypereutectic concentration of the second constituent wherein said solder composition is Sn: 12-37 wt% and Au: balance.

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Bacon teaches (see col. 1 lines 50-63 and claim 7) the advantage of using gold-tin compound solder having a thickness of less than 4  $\mu\text{m}$ .

Therefore, in view of Komata's teachings, a person skilled in the art would be motivated to provide a hypereutectic concentration of tin as disclosed by Komata. The motivation to do so is that the Au-Sn alloy solder exhibits good formability and good ductility as taught by Komata. It would have been obvious to employ a solder having a thickness of 1  $\mu\text{m}$  to 2  $\mu\text{m}$  since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. The motivation to do so is to provide a better thermal conductance.

Note that although Komata teaches brazing, it is to be noted that the recitation, "being consumed during soldering operation by one reacting and being dissolved ..." does not distinguish over Komata regardless of the method used to form the solder since claims are directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also *In re Brown*, 173 USPQ 685 and *In re Thorpe*, 227 USPQ 964, 966. Furthermore, the functional language, "Sn contained ... providing a continuous reduction in melting temperature during a soldering procedure" is directed to the device per se, no matter which of the device's functions is referred to in the claim. See *In re Ludtke and Sloan*, 169 USPQ 563 at 567, and *In re Swinehart*, 169 USPQ 226, both of which make it clear that it is the patentability of the device per se which must be determined in a "functional language" claim and not the patentability of the function, and that an old or obvious device alleged to perform a new function is not patentable as a device, whether claimed in "functional language" terms or not. Note that the above case law makes it clear that in such cases applicant has the burden of

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showing that a prior art device that appears reasonably capable of performing the allegedly novel function is in fact incapable of doing so. See MPEP § 2114. See *In re Schreiber*, 44 USPQ2d 1429, 1432 (Fed. Cir. 1997) (Spout having “taper ... such as to by itself jam up the popped popcorn before the end of the cone and permit the dispensing of only a few kernels at a shake” anticipated by an oil can spout having the same shape as spout Applicant disclosed as being adapted for dispensing said only a few kernels at said shake) for a discussion of the roles of examiner and applicant in determining when and how functional limitations distinguish a claim from prior art disclosing the same structure. See also *In re King*, 231 USPQ 136 (Fed. Cir, 1986) (“It did not suffice merely to assert that Komata does not inherently achieve hypereutectic concentration, challenging the PTO to prove the contrary by experiment or otherwise. The PTO is not equipped to perform such tasks.”)

### ***Response to Arguments***

The rejection over Spaeth in view of Komata cites new art. Applicant's arguments with respect to claim 15 have been considered but are moot in view of this new ground(s) of rejection.

As stated by Applicants, Kurokawa discloses a semiconductor pellet with gold-tin alloy. However, Kurokawa does not teach a hypereutectic concentration of tin. Regarding the argument that Komata describing a hypereutectic gold-tin alloy, but not in connection with a semiconductor device, it is pointed out that Komata (see abstract) teaches employing a hypereutectic gold-tin solder alloy for bonding IC packages. Therefore, it is clear that Komata does teach a hypereutectic gold-tin solder alloy in connection with a semiconductor device. Bacon teaches (col. 1, lines 60-63) “a gold-tin solder made desirably thin from the standpoint of

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good and sufficient thermal conductance -- i.e. 4 or 5  $\mu\text{m}$  or less," thus meeting the recited limitation, "thickness of from 1  $\mu\text{m}$  to about 2  $\mu\text{m}$ ." Furthermore, the rejection over Kurokawa in view of Komata and Bacon has been modified to explain the obviousness of the new limitation recited as, "Sn contained ... providing a continuous reduction in melting temperature during a soldering procedure" generating a new grounds of rejection. Applicant's arguments with respect to claim 15 have been considered but are moot in view of this new ground(s) of rejection.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to A. Sefer whose telephone number is (571) 272-1921.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ANS

January 9, 2007



THOMAS DICKEY  
PRIMARY PATENT EXAMINER